

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
BING AJ
FISH & RICHARDSON P.C.
12390 EL CAMINO REAL
SAN DIEGO, CA 92130

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing
(day/month/year)

26 SEP 2006

Applicant's or agent's file reference
15670-121WO1

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.
PCT/US05/23131

International filing date
(day/month/year) 29 June 2005 (29.06.2005)

Applicant
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70.

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/ US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
Facsimile No. (571) 273-3201

Authorized officer

David C. Payne

Telephone No. (571) 272-2600

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 15670-121WO1	FOR FURTHER ACTION		see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US05/23131	International filing date (<i>day/month/year</i>) 29 June 2005 (29.06.2005)	(Earliest) Priority Date (<i>day/month/year</i>)	
Applicant THE REGENTS OF THE UNIVERSITY OF CALIFORNIA			

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the Report

a. With regard to the **language**, the international search was carried out on the basis of:



the international application in the language in which it was filed.



a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐

With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☐ **Unity of invention is lacking** (See Box No. III)

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 2A



as suggested by the applicant.



as selected by this Authority, because the applicant failed to suggest a figure.



as selected by this Authority, because this figure better characterizes the invention.

b. ☐

none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/23131

Box IV TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)

Designs and techniques for transmitting electrical signals via transmission lines on integrated circuits without distortion and at the speed of light. In one implementation, one or more leakage resistors (201) are connected between the two conductor wires of a transmission line.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/23131

A. CLASSIFICATION OF SUBJECT MATTER

IPC: G02B 6/42(2006.01)

USPC: 398/202

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 398/202

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/0131135 A1 (CHOW et al.) 19 September 2002 (19.09.2002), entire document	1-24

☐

Further documents are listed in the continuation of Box C.

☐

See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

02 September 2006 (02.09.2006)

Date of mailing of the international search report

26 SEP 2006

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Authorized officer

David C. Payne

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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
BING AJ
FISH & RICHARDSON P.C.
12390 EL CAMINO REAL
SAN DIEGO, CA 92130

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) **26 SEP 2006**

Applicant's or agent's file reference

15670-121WO1

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/US05/23131

International filing date (day/month/year)

29 June 2005 (29.06.2005)

Priority date (day/month/year)

International Patent Classification (IPC) or both national classification and IPC

IPC: **G02B 6/42**(2006.01)

USPC: 398/202

Applicant

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (571) 273-3201

Date of completion of this opinion

02 September 2006 (02.09.2006)

Authorized officer

David C. Paine

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US05/23131

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
- ☐ table(s) related to the sequence listing

b. format of material

- ☐ on paper
- ☐ in electronic form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
- ☐ filed together with the international application in electronic form.
- ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US05/23131

Box No. V Reasoned statement under Rule 43 bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)

Claims NONE YES

Claims 1-24 NO

Inventive step (IS)

Claims NONE YES

Claims 1-24 NO

Industrial applicability (IA)

Claims 1-24 YES

Claims NONE NO

2. Citations and explanations:

Please See Continuation Sheet

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US05/23131

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

Claims 1-24 lack novelty under PCT Article 33(2) as being anticipated by Chow et al. US 2002/0131135 A1 (Chow).

Regarding claims 1, 20, and 22 Chow disclosed,

These needs may be addressed by the present invention which is embodied in an optical signal receiver for reception of an optical signal and conversion of that signal to an electrical signal. The receiver has an optical amplifier capable of receiving the optical signal. An optical splitter is optically coupled to the optical amplifier and has two optical outputs. An optical sensor is coupled to the optical splitter and has a first output terminal and a second output terminal. A first photo detector which produces an electrical signal in response to a light input is coupled between the first and second output terminals. The first photo detector element is exposed to the first output of the optical splitter. A second photo detector which produces an electrical signal in response to a light input is coupled between the first and second output terminals and in parallel with the first photo detector. The second photo detector element is exposed to the second output of the optical amplifier. The signal from the second output of the optical splitter is delayed relative to the signal from the first output. Paragraph 9.

The invention may also be embodied in a method of receiving an optical signal and converting the signal to an electrical signal. The light signal is amplified and then split into a first and second segment. The first segment is delayed and the first segment of the light signal and the second segment of the light signal are converted into electrical signals. The electrical signals are compared to generate an electrical signal representative of the optical signal. Paragraph 10.

The invention may also be embodied in an optical receiver for converting an amplified optical signal on an optical fiber to an electrical signal. The receiver has an optical connector connected to the optical fiber and a passive substrate. An active substrate is mounted on the passive substrate. A splitter is fabricated on the active substrate and coupled to the optical connector, the splitter has two outputs for splitting the optical signal. A first and second waveguide are coupled to the two outputs of the splitter respectively, the first waveguide being longer than the second waveguide. A first photo detector is optically coupled to the first waveguide and has an anode and a cathode. A second photo detector is optically coupled to the second waveguide and has a cathode coupled to the anode of the first photo detector and an anode coupled to the cathode of the first photo detector. An output node is coupled to the anode of the first photo detector and the cathode of the second photo detector. Paragraph 11.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US05/23131

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Regarding claims 2-19, 21, 23 and 24 Chow disclosed

FIG. 1 shows an integral -differential sensor optical receiver 10 which receives a signal from an input light source 12. The input light source 12 is a fiber optic cable in this example but may be from the output of a DWDM demultiplexer or the final output stage of a multi-link long haul span. The input light signal from the input light source 12 is first amplified by an optical amplifier 14. The optical amplifier 14 in this example is an Erbium Doped Fiber Amplifier (EDFA) but may be any suitable optical amplifier. The optical signal from the optical amplifier 14 is then coupled into an evanescent fiber splitter 16. The fiber splitter 16 has a first output 18 and a second output 20. The light signal is divided by the splitter 16 between the outputs 18 and 20. The second delayed output 20 is designed to have a longer optical path length as compared to the first output 18 and thus delays that light signal. The two light segments from the outputs 18 and 20 are input to a photo detector unit 22. The photo detector unit 22 has a first photo detector which is a photodiode 24 which senses the light from the output 18 and a second photo detector which is a photodiode 26 which senses the light from the delayed output 20. The photo detector unit 22 has two electrical output nodes 28 and 30 which are coupled to the photodiodes 24 and 26. The signal output of the receiver 10 is generated across the two output nodes 28 and 30 and are electrically connected to preamplifier electronics 32 for further signal processing, Paragraph 24.

[0025] FIG. 2 is a block diagram of the photo detector unit 22 in FIG. 1. The photodiodes 24 and 26 are PiN photodiodes in this example, but may also be Indium-Gallium-Arsenide (InGaAs) or any III-V compound material detector. The photo detector unit 22 also has two floating DC power supplies 36 and 38 and a bias resistor 40 connected to a DC bias potential source 42. Both of the photodiodes 24 and 26 operate in the reverse bias mode, Paragraph 25.

[0026] The first photodiode 24 has an anode 44 and a cathode 46. Similarly, the second photodiode 26 has an anode 48 and a cathode 50. The anode 44 of the first photodiode 24 is serially connected to the negative side of the first floating DC reverse bias power supply 36. The anode 48 of the second photodiode 26 is similarly connected to the negative side of a second floating DC reverse bias power supply 38. The cathode 46 of the photodiode 24 is connected to the positive side of bias power supply 38 to form the output node 28. The cathode 50 of the photodiode 26 is connected to the positive side of bias power supply 36 to form the output node 30, Paragraph 26.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under Article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

If a demand for international preliminary examination is made, the written opinion of the International Searching Authority will, except in certain cases where the International Preliminary Examining Authority did not act as International Searching Authority and where it has notified the International Bureau under Rule 66.1bis(b), be considered to be a written opinion of the International Preliminary Examining Authority. If a demand is made, the applicant may submit to the International Preliminary Examining Authority a reply to the written opinion together, where appropriate, with amendments before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later (Rule 43bis.1(c)).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the *PCT Applicant's Guide*, Volume II.



US 20020131135A1

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(19) **United States**(12) **Patent Application Publication** (10) **Pub. No.: US 2002/0131135 A1****Chow et al.**(43) **Pub. Date:****Sep. 19, 2002**(54) **INTEGRAL DIFFERENTIAL OPTICAL
SIGNAL RECEIVER**(52) **U.S. Cl.** 359/189; 385/14(76) **Inventors:** Alan Y. Chow, Wheaton, IL (US);
Vincent Y. Chow, Hanover Park, IL
(US)(57) **ABSTRACT**

Correspondence Address:
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P.O. Box 2828
Chicago, IL 60690-2828 (US)

An optical signal receiver for rapid and error free translation of optical signals into electrical signals is disclosed. The receiver is coupled to a light source. The light source is amplified and then split into two segments. One of the segments is delayed by a specific amount of time. Both segments are optically coupled to a photo detector. Each photo detector is coupled in parallel and are connected by two output terminals. When the voltage output by each photo detector is equal, the output terminals are balanced and will not have any voltage. The circuit will provide a voltage output on the terminal only on differential photo-currents sensed by the detector elements. The quiescent magnitude of the voltage output is a function of the value of the reverse bias voltage applied by the two voltage sources.

(21) **Appl. No.:** 09/812,214(22) **Filed:** Mar. 19, 2001**Publication Classification**(51) **Int. Cl.⁷** G02B 6/12; H04B 10/06